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EXAMINER

CRAIG, DWIN M

ART UNIT PAPER NUMBER

2123

7

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/559,531

Applicant(s)

CHRYSANTHAKOPOULOS,
GEORGIOS

Examiner

Dwin M Craig

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2000.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-36 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 4-28-2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2, 5 & 6.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

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DETAILED ACTION

1. Claims 1-36 have been presented for examination. Claims 1-36 have been examined and rejected.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Independent **Claims 1, 17 and 33** and dependent **Claims 2, 3, 6-11, 18 and 34-36** rejected under **35 U.S.C. 103(a)** as being unpatentable over **Bonola U.S. Patent 5,717,903** in view of **Tushie et al. U.S. Patent 6,202,155** and in further view of **Staats U.S. Patent 5,968,152** and in further view of “*OFFICIAL NOTICE*”.

2.1 As regards independent **Claims 1, 17 and 33** the *Bonola* reference discloses a method of emulating a device (*peripheral*) loading an emulation driver for the device, and dynamically exposing the emulated device functionality (**Col. 1 Lines 65-67, Col. 2 Lines 1-31**).

However, the *Bonola* reference does not expressly disclose, a **Virtual Device Object** and emulating a device by a node in a serial bus.

An artisan of ordinary skill would have been motivated to search the related device driver art to find a object oriented methods of abstracting computer peripheral devices in software for the purpose of developing device drivers before that actual hardware was available (*Bonola Col. 1 lines 40-63*). In the same art of emulating hardware devices in software, the *Tushie et al.* reference teaches a **Virtual Device Object (Figure 2 & 4, Col. 3 Lines 10-23)**.

Thus, it would have been obvious, to one of ordinary skill in the art, at the time the invention was made; to have combined the device emulation technologies of the *Bonola* reference with the object oriented object abstraction technologies of the *Tushie et al.* reference because, by allowing for easy configuration change to take place on a virtual model of a device rather than the device itself, changes can be made without having to use a complex programming language which would add complexity and expense (**Col. 3 Lines 19-24, Col. 4 Lines 45-55**).

An artisan of ordinary skill would have been motivated to write device drivers for providing a software abstraction layer to devices on a node of a serial bus to support the newer IEEE1394 technologies (*Bonola Col. 1 lines 40-63*). In the technology are of configuration of peripherals on a bus, the *Staats* reference discloses device drivers providing support for devices on nodes on a serial bus (*Staats, Figures 1, 4, 7, Col. 2 Lines 44-52*).

Thus, it would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have combined the device emulation technologies of the *Bonola* reference with the control of nodes on a serial bus technologies of the *Staats* reference because,

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by providing an improved method of using key space a large number of peripherals can be supported on a IEEE 1394 bus (**Col. 2 Lines 31-36**).

2.2 In regards to dependent **Claim 35** and the limitation of issuing a bus reset in independent **Claim 17** the *IEEE 1394* standard for a high speed serial bus teaches issuing bus resets and “*OFFICIAL NOTICE*” bus resets are known in the art as methods of initializing a plurality of devices on the bus and enumerating them. (*The Examiner notes that the IEEE 1394 bus standard is a 394-page document and in the interest of compact prosecution will not provide the document in this office action but will be happy to provide the document if the Applicant requests a copy.*)

2.3 As regards dependent **Claims 2 and 34**, the *Bonola* reference does not expressly disclose enumeration by the node of a serial bus.

The *Staats* reference discloses enumeration by the node of a serial bus (**Figures 1, 7, 8, 8A, 9 & 10, Col. 2 Lines 44-53, Col. 4 Lines 47-53**), it is noted by the Examiner that hierarchical fashion discussed in the *Staats* prior art reference is a form of enumeration.

2.4 As regards dependent **Claim 3** the *Bonola* reference does not expressly disclose a physical device object.

The *Tushie et al.* reference discloses a physical device object (**Figure 2 Item 203**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made to have modified the device emulation technologies of the *Bonola* reference with the object oriented programming technologies of the *Tushie et al.* reference because by abstracting the devices on the serial bus using software objects the many complex details of

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interacting with each device can be abstracted so that any programmer writing software to interact with a particular device doesn't have to know all of the details of what is involved in operating the device when that programmer needs to focus on only that functionality that is required to perform the programming task required.

2.5 As regards dependent **Claim 6** the *Bonola* reference does not expressly disclose a device being plugged into a serial bus.

The *Staats* reference discloses a device being plugged into a serial bus (**Figure 4, Col. 1 Lines 15-27, Col. 4 Lines 7-21**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have modified the device emulation methods of the *Bonola* reference with the serial bus technologies of the *Staats* reference because, a artisan of ordinary skill would have known of the 1394 bus methods of "hot" plugging new serial devices into the bus and the artisan would have relied on the methodologies of the *Bonola* reference in order to implement support for hot plugging serial devices into a 1394 serial bus after the host computer system had already completed the "boot" process.

2.6 As regards dependent **Claims 7 and 36** the *Bonola* reference does not expressly disclose the 1394 bus standard.

The *Staats* reference discloses the 1394 bus standard (**Col. 1 Lines 15-27**).

In regards to motivation to combine, please refer to paragraph **2.4** above.

2.7 As regards dependent **Claims 8 and 9** the *Bonola* reference discloses the *virtualization* of a peripheral device that is not affected by any bus events including addition or removal of a device (**Figure 10, Col. 17 Lines 19-48**). *Specifically*, the Examiner notes that the

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Bonola reference is teaching an emulated *virtual* device that is not affected by the functioning of other *real* devices and in fact, as disclosed in the cited lines and columns above, performs more efficiently because of the use of separate CPU's.

2.8 As regards dependent **Claims 10 and 11** the *Bonola* reference does not expressly disclose the node is a general-purpose computer running a general-purpose operating system or the emulated device functionality is done by configuration memory.

The *Staats* reference discloses the node is a general-purpose computer running a general-purpose operating system (**Figure 4, Col. 2 Lines 39-43, Col. 6 Lines 31-45**), or the emulated device functionality is done by configuration memory (**Figure 7 Col. 6 Lines 46-56**).

2.9 As regards dependent **Claim 18** the *Bonola* reference does not expressly disclose adding a unit directory to the configuration memory.

The *Staats* reference discloses adding a unit directory to the configuration memory (**Figures 1, 7, Col. 2 Lines 44-53**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made to have combined the *device emulation* methods of the *Bonola* reference with the *unit directory configuration* methods of the *Staats* reference because of the need to preserve "*key space*" (**Staats Col. 2 Lines 31-36**).

3. Dependent **Claims 4 and 5** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bonola U.S. Patent 5,717,903** in view of **Tushie et al. U.S. Patent 6,202,155** and in further view of **Staats U.S. Patent 5,968,152** and in further view of **Carter et al. U.S. Patent 5,996,050**.

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3.1 As regards independent **Claim 1**, see paragraph **2.1** above.

3.2 As regards dependent **Claim 4** the *Bonola* reference does not expressly disclose bus objects that then create other device objects.

The *Carter et al.* reference discloses bus objects creating other device objects (**Figure 1B**, items **204** and **600**, *note the pointers to items 218 and 220, also note the words “Bus Cycle Object Creation”*).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have combined the peripheral emulation methods of the *Bonola* reference with the computer bus abstraction methods of the *Carter et al.* reference because, object oriented design allow for reliable and efficient methods of monitoring system buses (*Carter et al. Col. 3 Lines 53-55*).

3.3 As regards dependent **Claim 5** the *Bonola* reference does not expressly disclose a 1394 bus object.

The *Staats* reference discloses a 1394 bus (**Figure 4**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have modified the peripheral emulation methods of the *Bonola* reference with the 1394 bus methods of the *Staats* reference because, object abstraction methods are known by ordinary artisans and these methods provide advantages in abstracting underlying software functionality that decreases the amount of time artisans are required to code software, so that new technologies, like “*Firewire*” or IEEE 1394 bus technologies can be quickly reduced to practice and implemented into today’s computing products.

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4. Independent **Claims 12 and 15** and dependent **Claim 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tushie et al. U.S. Patent 6,202,155** in view of **Brice et al. U.S. Patent 6,345,241**.

4.1 As regards independent **Claims 12 and 15** the *Tushie et al.* reference discloses a creating virtual device object (**Figure 6A item 603, Col. 3 Lines 10-23**).

However, the *Tushie et al.* reference does not expressly disclose data structures for the Virtual Device Object.

The *Brice et al.* reference discloses data structures for a simulated device in software (**Figures 5-12, Col. 17 lines 56-67, Col. 18 Lines 1-9**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made; to have combined the object oriented device virtualization methods of the *Tushie et al.* reference with the register data structures of the *Brice et al.* reference because, in order to model a device in memory, when emulating that device, data structures would be a obvious way to allocate memory to simulate hardware registers, to reflect the current state of the device being emulated.

4.2 As regards dependent **Claim 13** the *Tushie et al.* reference does not expressly disclose request fields and a flag field.

The *Brice et al.* reference discloses request fields and flag fields (**Figures 5 & 13**).

As regards to the motivation to combine the *Tushie et al.* reference and the *Brice et al.* reference, see paragraph 4.1 above.

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5. Dependent **Claims 14 and 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tushie et al. U.S. Patent 6,202,155** in view of **Brice et al. U.S. Patent 6,345,241** and in further view of **Chang U.S. Patent 6,327,637**.

5.1 As regards independent **Claim 12** see paragraph 4.1 above.

5.2 As regards dependent **Claims 14 and 16** the *Tushie et al.* reference does not expressly disclose a 1394 bus.

The *Chang* reference discloses a 1394 bus (**Figure 2**).

It would have been obvious, to one of ordinary skill in the art, the time the invention was made, to have written a software driver that was 1394 bus compliant if the virtual driver was supposed to emulate a device on a 1394 bus. The Examiner asserts that this is self-evident and that the *Chang* reference is presented only to show that the functionality of an IEEE 1394 bus is known in the art.

6. Independent **Claims 19 and 27** and dependent **Claims 20, 21, 26, 29 and 32** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Staats U.S. Patent 5,968,152** in view of **Bonola U.S. Patent 5,717,903**.

6.1 In regards to independent **Claims 19 and 27** the *Staats* reference teaches a serial bus (**Figure 4, Col. 1 Lines 15-28**), and a node connected to the serial bus (**Figure 4 Items 74, 78 82 or 80**) and in regards to the limitation of teaching a configuration memory compliant with the IEEE-1212 standard (**Col. 1 Lines 35-46**).

However the *Staats* reference does not expressly disclose emulation of a device on the serial bus.

The *Staats* reference discloses that there are problems with the number of future devices that can be added, do to limited key space (**Col. 4 Lines 61-64**), and that a driver image can be loaded from media that is plugged into the bus (**Col. 6 Lines 46-56**). An artisan of ordinary skill, knowing the *IEEE 1394* standard bus architecture accommodates hot removal and insertion of devices would want a method of providing a “*place holder*” for a device that has been temporarily removed but which can reasonably be assumed will be re-inserted at a future time. The artisan would not want the user of the computer system to have to wait while the device drive for the device at that particular node would have to be loaded and unloaded every time that particular peripheral was inserted into the bus. Thus, an artisan would look for a mechanism to represent that device on the serial bus with out the actual device actually being present. In the related art of peripheral emulation the *Bonola* reference teaches the emulation of a peripheral device that is not actually present (**Col. 1 Lines 65-67, Col. 2 Lines 1-31**).

Thus, it would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have combined the serial bus methods of the *Staats* reference with the peripheral emulation method of the *Bonola* reference because, by emulating a peripheral on the 1394 bus, the device driver for that device doesn't have to be reloaded every time the device is inserted into the bus, thus allowing the computer system to operate more efficiently.

6.2 As regards dependent **Claims 20 and 29** the *Staats* reference discloses an IEEE 1394 bus (**Col. 1 Lines 15-27**).

6.3 As regards dependent **Claim 21** the *Staats* reference discloses an IEEE 1212 compliant memory device (**Col. 1 Lines 35-46**).

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6.4 As regards dependent **Claim 26** the *Staats* reference discloses a physical device **(Figure 4)**.

6.5 As regards dependent **Claim 32** the *Staats* reference discloses a directory for a device **(Figure 1, Item 20)**.

7. Dependent **Claims 22 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Staats U.S. Patent 5,968,152** in view of **Bonola U.S. Patent 5,717,903** and in further view of **Carter et al. U.S. Patent 5,996,050**.

7.1 As regards independent **Claim 19** see paragraph 6.1 above.

7.2 As regards dependent **Claim 21** see paragraph 6.3 above.

7.3 As regards dependent **Claim 22** the *Staats* reference does not expressly disclose a bus driver and device objects used for communications on the bus.

The *Carter et al.* reference discloses a bus driver and device objects used for communications on the bus **(Figure 1B)**.

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made; to have combined the serial bus teachings of the *Staats* reference with the object oriented bus control methods of the *Carter et al.* reference because, object oriented methods of abstracting hardware devices provides a simple and efficient method of sending and receiving data to and from hardware devices without the programmer having to know all of the details of how the hardware device functions.

7.4 As regards dependent **Claim 23** the *Staats* reference discloses a 1394 based bus **(Col. 1 Lines 15-26)**.

8. Dependent **Claims 24 and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Staats U.S. Patent 5,968,152** in view of **Bonola U.S. Patent 5,717,903** and in further view of **Carter et al. U.S. Patent 5,996,050** and in further view of **Tushie et al. U.S. Patent 6,202,155**.

8.1 As regards independent **Claim 19** see paragraph 6.1 above.

8.2 As regards dependent **Claim 21** see paragraph 6.3 above.

8.3 As regards dependent **Claim 22** see paragraph 7.3 above.

8.4 As regards dependent **Claims 24 and 25**, the *Staats* reference does not expressly disclose virtual device objects and virtual device drivers.

The *Tushie et al.* reference discloses virtual device objects and virtual device drivers (**Figure 2, Col. 3 Lines 10-24**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have modified the serial bus methods of the *Staats* reference with the device virtualization methods of the *Tushie et al.* reference because, the methods in the *Tushie et al.* reference are useful for abstracting computing devices connected both locally and remotely (***Tushie et al. Col. 4 Lines 45-55***).

9. Dependent **Claims 28** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Staats U.S. Patent 5,968,152** in view of **Bonola U.S. Patent 5,717,903** and in further view of **Carter et al. U.S. Patent 5,996,050**.

9.1 In regards to independent **Claim 27** see paragraph 6.1 above.

9.2 In regards to dependent **Claim 28** the *Staats* reference does not expressly disclose bus driver and device objects used for communications on a bus.

The *Carter et al.* reference discloses a bus driver and device objects used for communications on the bus (**Figure 1B**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made; to have combined the serial bus teachings of the *Staats* reference with the object oriented bus control methods of the *Carter et al.* reference because, object oriented methods of abstracting hardware devices provides a simple and efficient method of sending and receiving data to and from hardware devices without the programmer having to know all of the details of how the hardware device functions.

10. Dependent **Claims 30 and 31** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Staats U.S. Patent 5,968,152** in view of **Bonola U.S. Patent 5,717,903** and in further view of **Tushie et al. U.S. Patent 6,202,155**.

10.1 As regards independent **Claim 27** see paragraph **6.1** above.

10.2 As regards dependent **Claims 30 and 31**, the *Staats* reference does not expressly disclose virtual device objects and virtual device drivers.

The *Tushie et al.* reference discloses virtual device objects and virtual device drivers (**Figure 2, Col. 3 Lines 10-24**).

It would have been obvious, to one of ordinary skill in the art, at the time the invention was made, to have modified the serial bus methods of the *Staats* reference with the device virtualization methods of the *Tushie et al.* reference because, the methods in the *Tushie et*

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al. reference are useful for abstracting computing devices connected both locally and remotely
(*Tushie et al. Col. 4 Lines 45-55*).

Conclusion


11. Claims 1-36 have been presented for examination. Claims 1-26 have been examined and rejected. This office action is **NON-FINAL**.

11.1 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dwin M Craig whose telephone number is 703 305-7150. The examiner can normally be reached on 10:00 - 6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached on 703 305-9704. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DMC


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